KOOSKIA WATER DEPARTMENT (PWS 2250032)
SOURCE WATER ASSESSMENT FINAL REPORT

January 14, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated source water assessment area and sensitivity factors associated with the well and aquifer characteristics.

This report, *Source Water Assessment for Kooskia Water Department, Kooskia, Idaho,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Kooskia Water Department drinking water system consists of four ground water wells. Well #1 and Well #2 are used as backup wells and Well #3 and Well #4 are the main wells of the system. Well #1 is the oldest well and is only used on an emergency basis. It is located approximately 100 feet south of the Middle Fork of the Clearwater River. Well #2 is an older well and is also only used on an emergency basis. It is located slightly east of Well #1 near the river. Well #3 is one of the primary wells, drilled in 1974. It is located on a hillside of Mt. Stewart south of the city of Kooskia. Well #4 is the newest well, drilled in 1993. It is located in the city park, southwest of city hall on Front Street. Water from the wells is stored in a 364,000-gallon aboveground, steel reservoir constructed in 1989. The city chlorinates the water once a month for general maintenance. The Kooskia drinking water system currently serves 692 people through 324 connections.

Final susceptibility scores are derived from equally weighing system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential Contaminants/Land Uses are divided into four categories, inorganic contaminants (IOCs, i.e. nitrates, arsenic), volatile organic contaminants (VOCs, i.e. petroleum products), synthetic organic contaminants (SOCs, i.e. pesticides), and microbial contaminants (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

In terms of total susceptibility, Wells #2 and #4 rate automatically high for IOCs, VOCs, SOCs, and microbials. Two separate roads run within 50 feet of each of Well #2 and Well #4. Well #1 rates high for all potential contaminant categories due the unavailability of a well log and the number of contaminants in the 3-year time of travel (TOT) zone of the delineation. Well #3 rates moderate for all potential contaminant categories. System construction rated moderate and hydrologic sensitivity rated high for all of the wells, contributing to the overall susceptibility of the system.

No VOCs or SOCs have ever been detected in the wells. Trace concentrations of the IOCs chromium, fluoride, nitrate, and sodium have been detected in tested water, but at concentrations significantly below maximum contamination levels (MCLs) as set by the EPA. Alpha and beta particles (radionuclides) have also been detected in the distribution system and at Well #1, Well #3, and Well #4 at levels below the MCLs.

A repeat detection of total coliform bacteria at Well #4 was recorded in August 1994. However, in 1995, the casing for Well #4 was resealed. No further detections of coliform bacteria have occurred at that well. Total coliform bacteria and fecal coliform bacteria have had two confirmatory detections in the distribution system in June 1993 and again in August 1994. There have also been several single detections of total coliform bacteria from June 1993 to February 1996 in the distribution system.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Kooskia Water Department, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Actions should be taken to keep a 50-foot radius perimeter clear of all potential contaminants from around the wellhead. The use of the roads that pass within 50 feet of Well #2 and Well #4 may need to be limited to avoid contamination to the wells. Any contaminant spills within the delineation should be carefully monitored and dealt with. If the microbial contamination persists in the drinking water system, the City of Kooskia may need to implement a regular treatment program. As much of the designated protection areas are outside the direct jurisdiction of the Kooskia Water Department drinking water system, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, the well should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus on any drinking water protection plan as the delineation contains some urban and residential land uses. Public education topics could include proper lawn care practices, household hazardous waste disposal methods, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. As there are transportation corridors through the delineation, the Idaho Department of Transportation should be involved in protection activities.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific bet management practices). For assistance in developing protection strategies please contact the Lewiston Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR KOOSKIA WATER DEPARTMENT, KOOSKIA, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the rankings of this assessment mean.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment is also included.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the EPA to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The local community, based on its own needs and limitations, should determine the decision as to the amount and types of information necessary to develop a drinking water protection program. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Kooskia Water Department drinking water system consists of four ground water wells. Well #1 and Well #2 are used as backup wells and Well #3 and Well #4 are the main wells of the system. Well #1 is the oldest well and is only used on an emergency basis. It is located approximately 100 feet south of the Middle Fork of the Clearwater River. Well #2 is an older well and is also only used on an emergency basis. It is located slightly east of Well #1 near the river. Well #3 is one of the primary wells, drilled in 1974. It is located on a hillside of Mt. Stewart south of the city of Kooskia. Well #4 is the newest well, drilled in 1993. It is located in the city park, southwest of city hall on Front Street (Figure 1). Water from the wells is stored in a 364,000-gallon above-ground, steel reservoir constructed in 1989. The city chlorinates the water once a month for general maintenance. The Kooskia drinking water system currently serves 692 people through 324 connections.

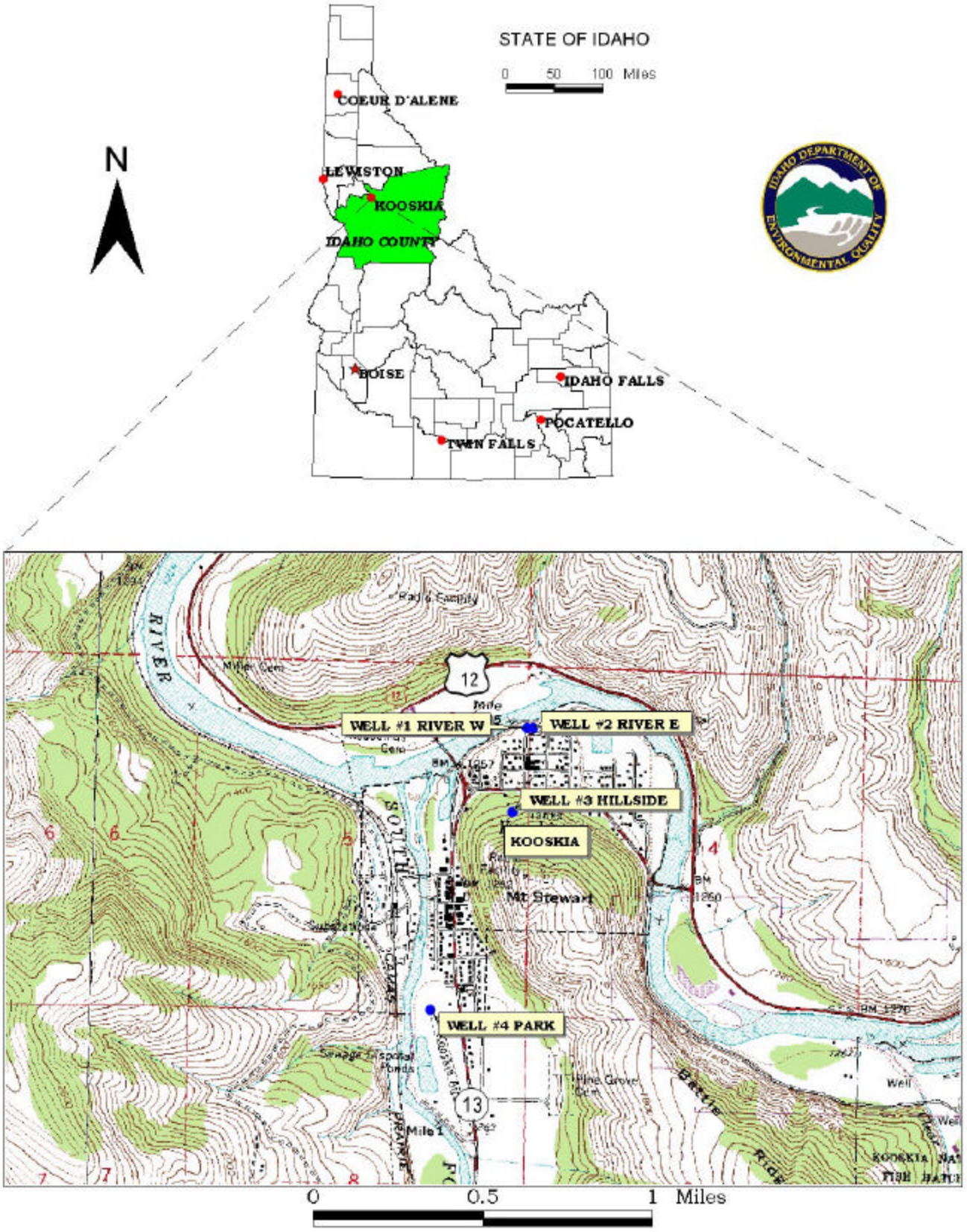
No VOCs or SOCs have ever been detected in the wells. Trace concentrations of the IOCs chromium, fluoride, nitrate, and sodium have been detected in tested water, but at concentrations significantly below maximum contamination levels (MCLs) as set by the EPA. Alpha and beta particles (radionuclides) have also been detected in the distribution system and at Well #1, Well #3, and Well #4 at levels below the MCLs.

A repeat detection of total coliform bacteria at Well #4 was recorded in August 1994. However, in 1995, the casing for Well #4 was resealed. No further detections of coliform bacteria have occurred at that well. Total coliform bacteria and fecal coliform bacteria have had two confirmatory detections in the distribution system in June 1993 and again in August 1994. There have also been several single detections of total coliform bacteria from June 1993 to February 1996 in the distribution system. However, no detections have occurred since that time.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with the University of Idaho to perform the delineations using a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water in the vicinity of the Kooskia Water Department wells. The computer model used site specific data, assimilated by the University of Idaho from a variety of sources including operator input, local area well logs, and hydrogeologic reports (detailed below).

FIGURE 1. Geographic Location of Kooskia Water Department



The conceptual hydrogeologic model for the Kooskia/Stites area source wells is based on interpretation of available well logs, published geologic maps and reports by Spenke and Associates. Kooskia lies at the confluence of the Middle and South Forks of the Clearwater River. Stites lies along the eastern side of the South Fork of the Clearwater River, south of Kooskia. Bedrock geolgoy is based on the geologic maps of the Hamilton quadrangle and Pullman quadrangle at a scale of 1:25,000 (Rember and Bennett, 1979). Sprenke and Associates (1991) conducted a ground water analysis of the Stites area. Their work is extrapolated to the Kooskia area. According to Sprenke and Associates (1991) a north-trending normal fault bounds the area to the east; the western side of the area may be bound by another fault, which is not mapped nor is shown in the report. Another unmapped fault may bound the area to the north (also not shown), which may isolate ground water flow from the Clearwater River. A southern boudary has not been identified. Water is derived from the Grande Ronde Basalt aquifer (Sprenke and Associates, 1991). Sprenke and Associates suggested that the river forms a positive boundary where it flows over aquifers that crop out in the river near Kooskia (i.e. leakage to the ground water); they represented the boundary as a constant head in the northern part of their numerical model.

The ground elevation is approximately 1,260 to 1,330 feet above mean sea level (AMSL) near the rivers. Discharge from the source wells range from 10 gallons per minute (gpm) to 400 gpm (Kooskia Well #4).

A north-south trending fault is mapped through Kooskia and Stites. According to Sprenke and Associates (1991) the fault is a barrier to flow. Another fault (west-east trending) is believed to connect with the top of the north-south fault and project toward the east at a 90 degree angle.

The headwaters of the Clearwater River are approximately seven miles east of Syringa, ID at the confluence of the Lochsa and Selway Rivers. The river discharges into the Snake River at Lewiston. Most of the water in the river during baseflow conditions is from ground water. Runoff of snowmelt contributes to the river during the spring months also contributes to the river. Near Kamiah the Clearwater River separates two generalized hydrologic provinces, the Clearwater Plateau to the west and the Clearwater Uplands to the east. It is unknown whether the Clearwater River is gaining or losing at this reach of the river due to the complex hydogeology. Water elevations in wells near and adjacent to the river are very different supporting Sprenke and Associates' hypothesis that a no-flow boundary exists in the area. The Clearwater River has an elevation of approximately 1,263 feet AMSL. Sprenke and Associates (1991) modeled the Middle Fork of the Clearwater River as a constant head boundary.

The South Fork of the Cleawater River is also believed to act as a constant head based on nearby water levels.

A no-flow boundary represents the north-south trending fault through Kooskia and Stites. The west-east trending fault is not included because there are no data to suggest that it forms a boundary. The fault does not affect the capture zones or test point calibration when added to the models.

The Middle Fork of the Cleawater River is modeled as a constant head boundary with an elevation of 1,263 feet. The South Fork of the Clearwater River is modeled as a constant head boundary with a northern elevation of 1,260 feet AMSL and a southern elevation of 1,326 feet AMSL.

No aquifer recharge data are available for the Kooskia area. In a study by Wyatt-Jaykim (1994) recharge to the central basin (Lewiston basin) was modeled as 1 inch per year (in/yr); 2 in/yr was selected in the higher areas. Because the Kooskia area lies at a higher elevation, precipitation rates are higher. Recharge is therefore expected to be greater.

The amount of areal recharge used in the model for the source wells was 2 in/yr. This is a low value for higher elevations. Elevations in the vicinity of the well are approximately 1,300 feet AMSL with the nearby topography climbing to over 2,000 feet AMSL compared to Lewiston at approximately 700 feet AMSL.

Neighboring private wells are used for test points in the WhAEM 2000 (Kraemer, et al., 2000) simulations. Information on test points was obtained from a search of the Idaho Department of Water Resources (IDWR) database available on the Internet. The locations of the test points are limited to information supplied on the well logs, typically the quarter-quarter section (0.25 $mile^2$). Therefore, the accuracy of the test point elevations and the static water elevations is dependent upon the accuracy of the driller's log and the amount of topgraphic relief in the quarter-quarter section.

The capture zones delineated herein are based on limited data and must be taken as best estimates. If more data become available in the future these delineations should be adjusted based on additional modeling incorporating the new data. The WhAEM model is used to delineate the capture zones.

The delineated source water assessment areas for the well of Kooskia Water Department water system varies depending on the location of the well. Wells #1, #2, and #3, located closer to the Middle Fork of the Clearwater, can best be described as northeast trending corridors extending from south of the river toward Maggie Creek (Figures 2, 3, and 4, Appendix A). The delineation for Well #1 is affected by the aquifer draw of Well #2, located nearby. The Well #1 delineated area is more horseshoe-shaped but is still trending northeast. The delineated are for Well #4 (located closer to the South Fork of the Clearwater) is an easterly trending corridor that stretches from the South Fork of the Clearwater and follows east along the Middle Fork of the Clearwater (Figure 5, Appendix A). The actual data used by the University of Idaho in determining the source water assessment delineation areas is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area and the surrounding area of the Kooskia Water Department well is predominantly woodland.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in November and December 2002. The first phase involved identifying and documenting potential contaminant sources within the Kooskia Water Department source water assessment areas (Figures 2, 3, 4, and 5 in Appendix A) through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

All of the delineated source water assessment areas of the Kooskia Water Department wells contain Highway 12, the Middle Fork of the Clearwater River, and at least one improved road. The transportation corridors and the river could contribute leachable contaminants to the aquifer in the event of an accidental spill, release, or flood. The delineated areas for Well #1 and Well #2 include mines or gravel pits, areas often used for dumping that can contribute all types of contaminants to the aquifer. Because Well #4 is located in the middle of the city, it includes National Pollution Discharge Elimination systems (NPDES), underground storage tanks (USTs), auto repair shops, cell towers, and gas stations. Additionally, the 1995 Ground Water Under Direct Influence (GWUDI) field survey indicates that roads run within 50 feet of Well #2 and Well #4. This 50-foot zone is considered the 1A zone and results in an automatic high susceptibility to contaminants. Tables 2 through 5 in Appendix A list the potential contaminants for each well.

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix B contains the susceptibility analysis worksheets for the system. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity rated high for all of the Kooskia wells. Area soils are moderately to well drained. The well logs for Well #1 and Well #2 were not available preventing a determination of the composition of the vadose zone, the location of first ground water, and the presence of any fine-grained zones that could form an aquitard above the producing zone. The composition of the vadose zones for both Well #3 and Well #4 consisted mostly of basalt. There were little or no fine-grained zones above the producing zones of either of the wells. First ground water for Well #3 is found at 320 feet below ground surface (bgs), a depth greater than the protective 300 feet bgs. First ground water for Well #4 is found between 85 feet and 126 feet bgs.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced. A sanitary survey was conducted in 2001 for the system.

Well #1 is the oldest of the Kooskia wells and is only used in emergencies. The well log for this well is unavailable, limiting the amount of construction information concerning the casing depth and thickness, the annular seal depth, the composition of the soil layers, the highest production zone, and the static water level. According to the 2001 sanitary survey, the well was drilled in 1960 to a depth of approximately 102 feet bgs. It has a 14-inch casing that extends five feet above the wellhouse floor.

Well #2 is the second oldest of the Kooskia wells and is also an emergency backup well. The well log for this well is also unavailable. According to the 2001 sanitary survey, the well was drilled in 1966 to a depth of 112 feet bgs. It has an 8-inch casing that extends 2 feet above the wellhouse floor.

Well #3 was drilled in 1974 to a depth of 380 feet bgs. It has a 0.250-inch thick, 8-inch diameter casing set to 135 feet bgs into hard black basalt followed by a 0.250-inch thick, 7-inch diameter casing set to 380 feet bgs into basalt with green seams. The annular seal is placed to a depth of 18 feet bgs into hard basalt. The casing is perforated from 322 feet bgs to 380 feet bgs and the static water level of the well is found at 230 feet bgs. Well #3 is one of the primary wells of the Kooskia Water Department drinking water system.

Well #4, the newest well, was drilled in 1993 to a depth of 160 feet bgs. It was deepened in 1995 to a depth of 180 feet bgs. During the deepening the well was resealed. It has a 0.250-inch thick, 12-inch diameter casing set to a depth of 40 feet bgs into basalt followed by a 0.250-inch thick, 8-inch diameter casing set to a depth of 153 feet bgs into basalt. The annular seal was placed (in 1995) to a depth of 99 feet bgs into basalt. The casing is perforated from 110 feet bgs to 147 feet bgs and the static water level is found at 5 feet bgs.

All of the Kooskia Water Department wells have a moderately susceptible system construction. According to the 2001 sanitary survey, all of the wellhead and surface seals are maintained to standards and the wells are properly vented. The wells are located outside of the 100-year flood plain and are properly protected from surface flooding. According to the well logs for Well #3 and Well #4, the highest production zone is at least or greater than 100 feet below the static water level. However, the casings and annular seals for Well #3 and Well #4 do not extend to low permeable units. Because the well logs for Well #1 and Well #2 were unavailable, the highest production zones or the placement of the casings and annular seals could not be determined.

Though the well may have been in compliance with standards when it was completed, current PWS well construction standards are more stringent. The IDWR *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. These standards include provisions for well screens, pumping tests, and casing thicknesses to name a few. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. An eight-inch diameter casing requires a casing thickness of 0.322-inches and a twelve-inch diameter casing requires a casing thickness of 0.375-inches. Therefore, Well #3 and Well #4 did not meet the IDWR criteria for well construction standards. For Well #1 and Well #2, there was insufficient information available to determine if the wells meet all the criteria outlined in the IDWR Well Construction Standards.

Potential Contaminant Source and Land Use

The wells rated moderate for IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products, chlorinated solvents) and SOCs (i.e. pesticides), and low for microbial contaminants (i.e. bacteria). The transportation corridors, the rivers and creeks, and several of the potential contaminants identifies through DEQ databases are located in the 3-year TOT zones of the delineations, contributing to the overall land use score. However, the predominant woodland land use of the area makes the wells less susceptible to contamination.

Final Susceptibility Ranking

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. In this case, total coliform bacteria were detected repeatedly in August 1994 at Well #4, which would have given an automatic high susceptibility for microbial contaminants. However, the well was resealed, correcting the bacterial issue. Additionally, if there are contaminant sources located within 50 feet of the source then the wellhead will automatically get a high susceptibility rating. Roads run within 50 feet of Well #2 and Well #4, resulting in automatic high susceptibility ratings to all potential contaminant categories. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking. Well #3 has moderate susceptibility to all potential contaminant categories and Well #1, Well #2, and Well #4 have a high susceptibility to all potential contaminant categories.

Table 1. Summary of Kooskia Water Department Susceptibility Evaluation

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	H	M	M	M	L	M	H	H	H	H
Well #2	H	M	M	M	L	M	H(*)	H(*)	H(*)	H(*)
Well #3	H	M	M	M	L	M	M	M	M	M
Well #4	H	M	M	M	L	M	H*	H*	H*	H*

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
(*) = automatic high susceptibility due to a road that runs within 50 feet of the wellhead and also a high number of overall points
*** = automatic high susceptibility due to Front Street that runs within 50 feet of the wellhead**

Susceptibility Summary

The Kooskia Water Department drinking water system consists of four ground water wells. Well #1 and Well #2 are used as backup wells and Well #3 and Well #4 are the main wells of the system. Well #1 is the oldest well and is only used on an emergency basis. It is located approximately 100 feet south of the Middle Fork of the Clearwater River. Well #2 is an older well and is also only used on an emergency basis. It is located slightly east of Well #1 near the river. Well #3 is one of the primary wells, drilled in 1974. It is located on a hillside of Mt. Stewart south of the city of Kooskia. Well #4 is the newest well, drilled in 1993. It is located in the city park, southwest of city hall on Front Street (Figure 1). Water from the wells is stored in a 364,000-gallon aboveground, steel reservoir constructed in 1989. The city chlorinates the water once a month for general maintenance. The Kooskia drinking water system currently serves 692 people through 324 connections.

In terms of total susceptibility, Wells #2 and #4 rate automatically high for IOCs, VOCs, SOCs, and microbials. Two separate roads run within 50 feet of each of Well #2 and Well #4. Wells #1 rates high for all potential contaminant categories due the unavailability of the well log and several potential contaminants in the 3-year TOT zone. Well #3 rates moderate for all potential contaminant categories. System construction rated moderate and hydrologic sensitivity rated high for all of the wells, contributing to the overall susceptibility of the system.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the Kooskia Water Department, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. Actions should be taken to keep a 50-foot radius perimeter clear of all potential contaminants from around the wellhead. The use of the roads that pass within 50 feet of Well #2 and Well #4 may need to be limited to avoid contamination to the wells. Any contaminant spills within the delineation should be carefully monitored and dealt with. If the microbial contamination persists in the drinking water system, the City of Kooskia may need to implement a regular treatment program. As much of the designated protection areas are outside the direct jurisdiction of the Kooskia Water Department drinking water system, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, the well should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. As there are many houses within the delineation, a strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include proper lawn and garden care practices, hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Lewiston Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Lewiston Regional DEQ Office (208) 799-4370

State DEQ Office (208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper, mlharper@idahoruralwater.com, Idaho Rural Water Association, at 208-343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

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Appendix A

Kooskia Water Department
Potential Contaminant Inventory
Figures 2, 3, 4, and 5
Tables 2, 3, 4, and 5

FIGURE 2. Kooskia Water Department Delineation Map and Potential Contaminant Source Locations

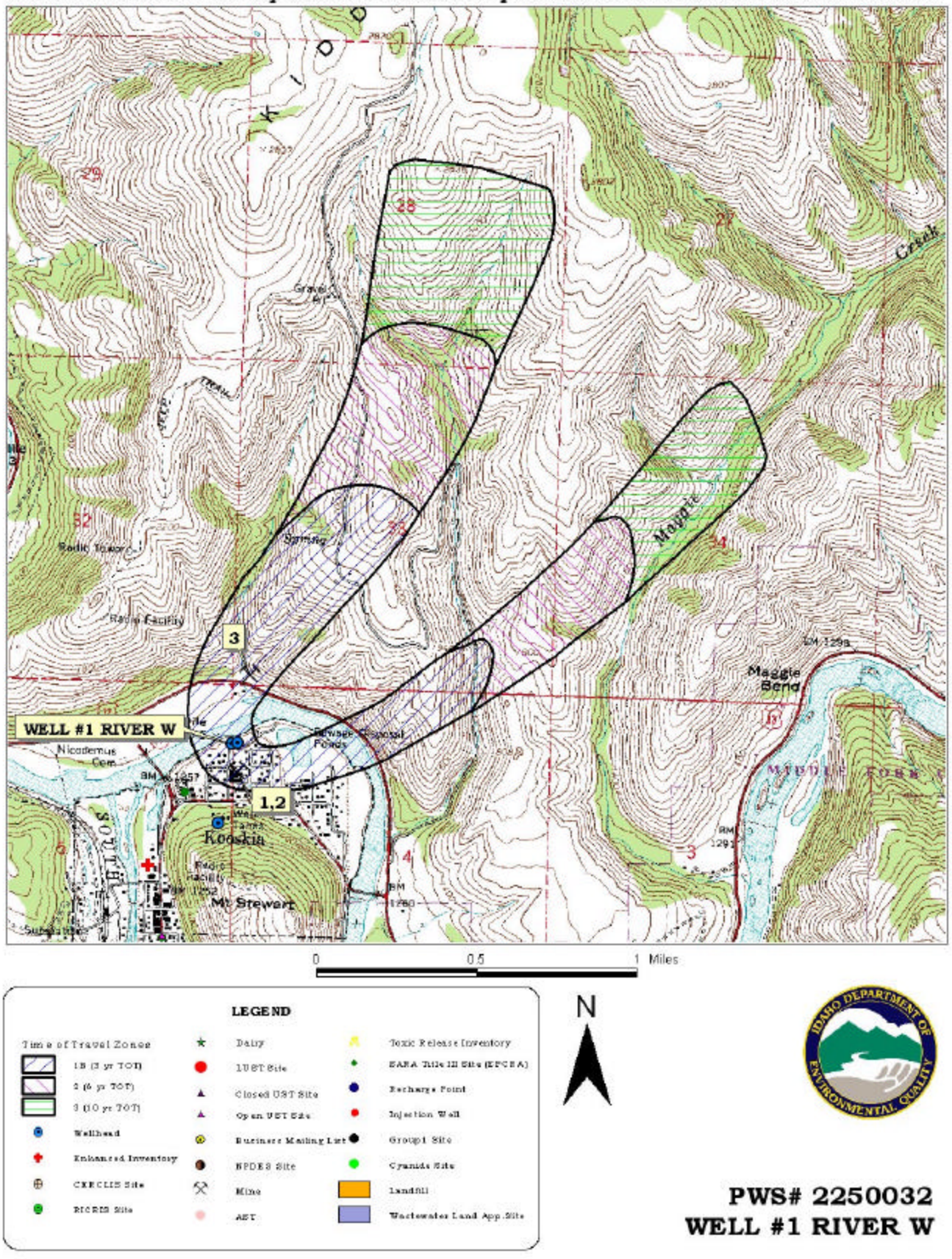
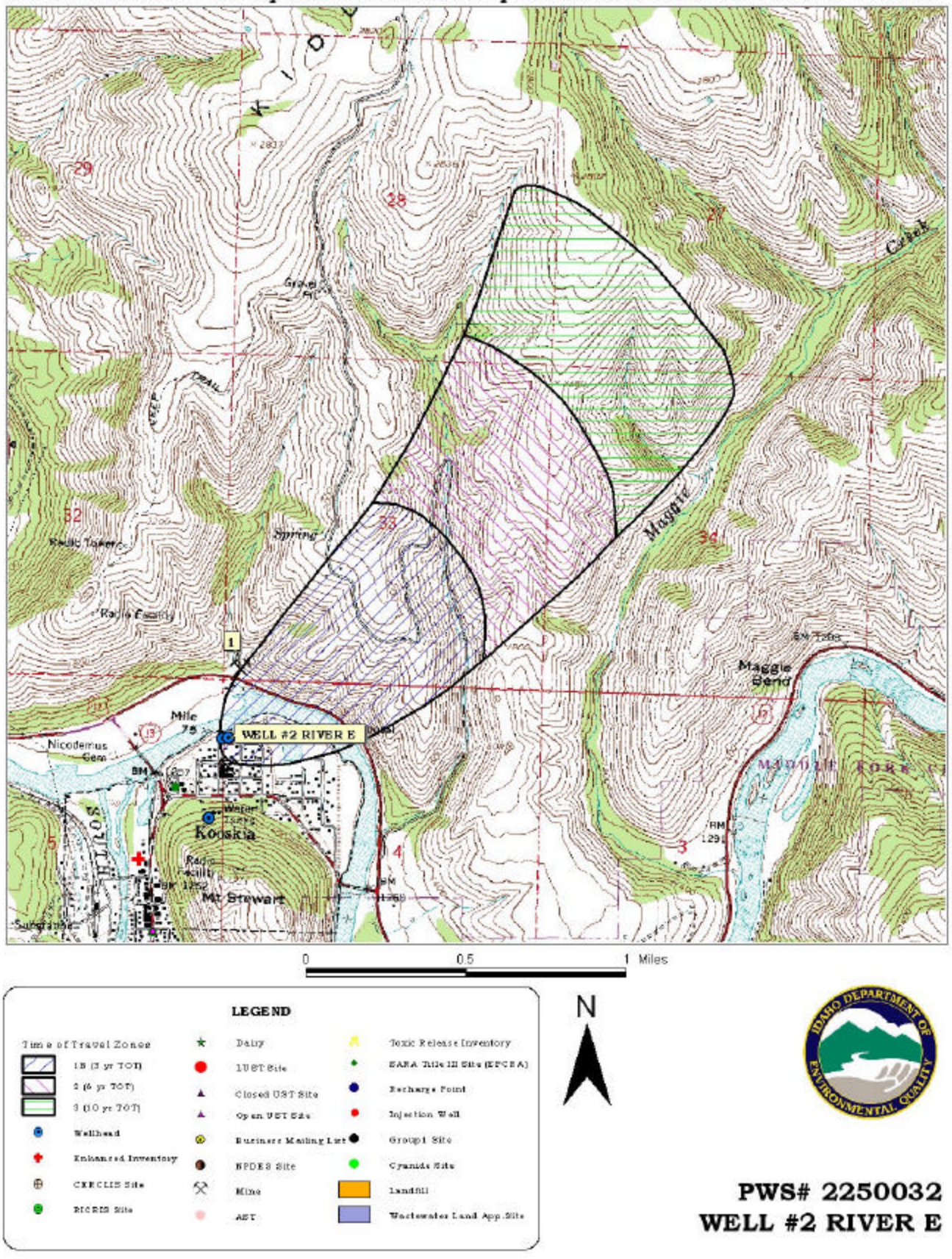
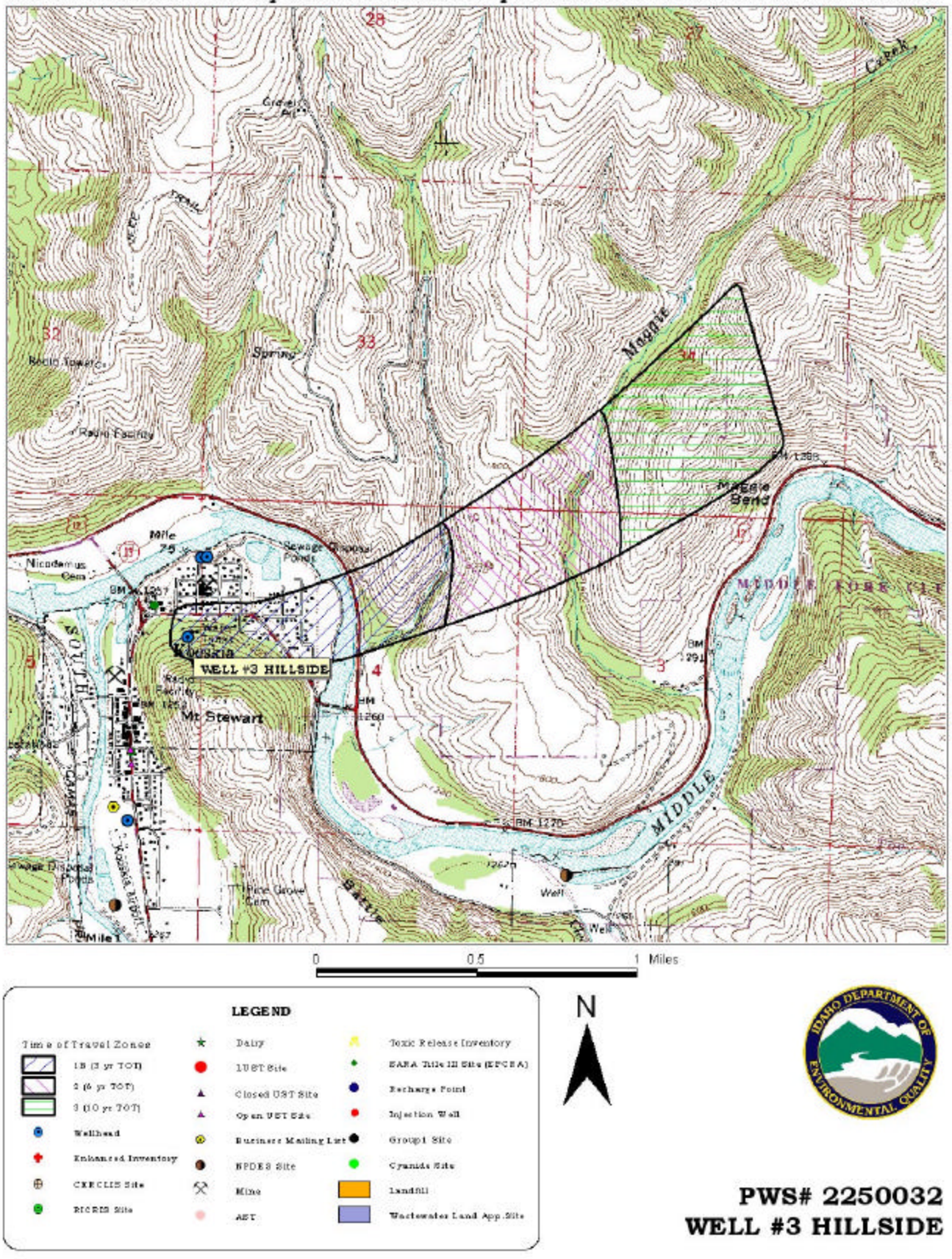


FIGURE 3. Kooskia Water Department Delineation Map and Potential Contaminant Source Locations



PWS# 2250032
WELL #2 RIVER E

FIGURE 4. Kooskia Water Department Delineation Map and Potential Contaminant Source Locations



PWS# 2250032
WELL #3 HILLSIDE

FIGURE 5. Kooskia Water Department Delineation Map and Potential Contaminant Source Locations

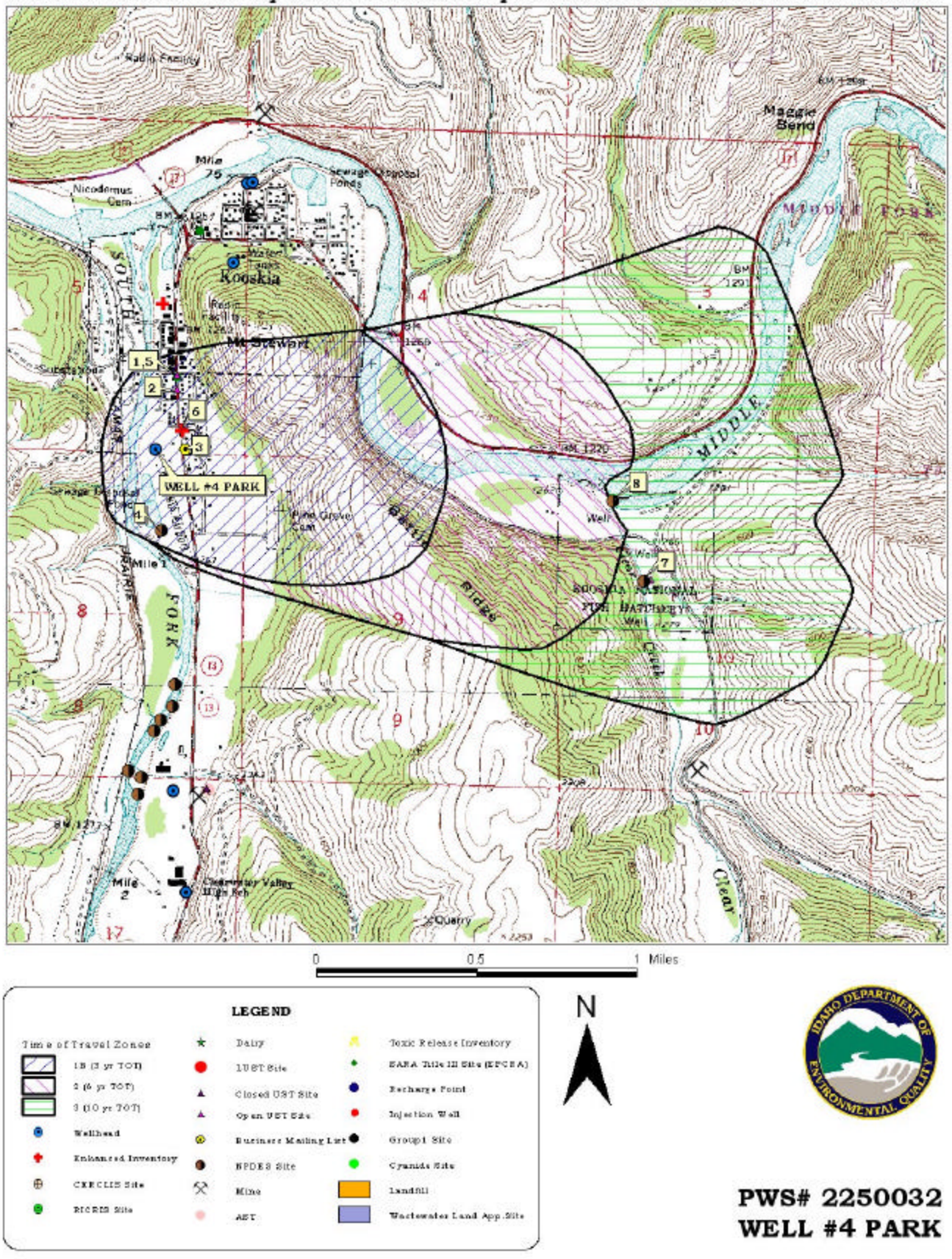


Table 2. Kooskia Water Department, Well #1, Potential Contaminant Inventory and Land Use

Site	Description of Source	TOT[1] Zone	Source of Information	Potential Contaminants[2]
1	Mine	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
2	Mine	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
3	Mine	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
	Middle Fork of the Clearwater River	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Highway 12	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Road	0-6 YR	GIS Map	IOC, VOC, SOC, Microbials
	Maggie Creek	6-10 YR	GIS Map	IOC, VOC, SOC

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 3. Kooskia Water Department, Well #2, Potential Contaminant Inventory and Land Use

Site	Description of Source	TOT[1] Zone	Source of Information	Potential Contaminants[2]
1	Mine	0-3 YR	Database Search	IOC, VOC, SOC, Microbials
	Middle Fork of the Clearwater River	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Highway 12	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Road	0-6 YR	GIS Map	IOC, VOC, SOC, Microbials
	Road	0-3 YR (1A)	1995 GWUDI Survey	IOC, VOC, SOC, Microbials

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 4. Kooskia Water Department, Well #3, Potential Contaminant Inventory and Land Use

Site	Description of Source	TOT[1] Zone	Source of Information	Potential Contaminants[2]
	Middle Fork of the Clearwater River	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Highway 12	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Highway 13	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Maggie Creek	3-10 YR	GIS Map	IOC, VOC, SOC

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 5. Kooskia Water Department, Well #4, Potential Contaminant Inventory and Land Use

Site	Description of Source[1]	TOT[2] Zone	Source of Information	Potential Contaminants[3]
1	UST Site-Open	0-3 YR	Database Search	VOC, SOC
2	UST Site-Open	0-3 YR	Database Search	VOC, SOC
3	Wrecker Service	0-3 YR	Database Search	IOC, VOC, SOC
4	NPDES-Municipal	0-3 YR	Database Search	IOC, Microbials
5	SARA site-Telephone Com, Except Radio	0-3 YR	Database Search	SOC
6	Gas Station	0-3 YR	Enhanced Inventory	IOC, VOC, SOC, Microbials
7	NPDES-Aquaculture	6-10 YR	Database Search	IOC
8	NPDES-Aquaculture	6-10 YR	Database Search	IOC
	South Fork of the Clearwater River	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Middle Fork of the Clearwater River	0-10 YR	GIS Map	IOC, VOC, SOC, Microbials
	Highway 12	0-10 YR	GIS Map	IOC, VOC, SOC, Microbials
	Highway 13	0-6 YR	GIS Map	IOC, VOC, SOC, Microbials
	Clear Creek	6-10 YR	GIS Map	IOC, VOC, SOC
	Camas Prairie Railroad	0-3 YR	GIS Map	IOC, VOC, SOC, Microbials
	Front Street	0-3 YR (1A)	1995 GWUDI Survey	IOC, VOC, SOC, Microbials

[1] UST = underground storage tank, NPDES = national pollution discharge elimination system, SARA = superfund amendments reauthorization act

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Appendix B

Kooskia Water Department
Susceptibility Analysis
Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report Public Water System Name : KOOSKIA WATER DEPT Well# : WELL #1 RIVER W

Public Water System Number 2250032 12/9/02 2:31:45 PM

1. System Construction		SCORE			
Drill Date	1/1/60				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	2001			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
	Total System Construction Score	4			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
	Total Hydrologic Score	6			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	5	5	5	5
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	5	5	5	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	12	12	8
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		17	17	17	8
4. Final Susceptibility Source Score		13	13	13	13
5. Final Well Ranking		High	High	High	High

Ground Water Susceptibility Report Public Water System Name : KOOSKIA WATER DEPT Well# : WELL #2 RIVER E

Public Water System Number 2250032 12/9/02 2:32:02 PM

1. System Construction		SCORE
Drill Date	1/1/66	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	YES	2001
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		4

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		6

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	4	4	4	4
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	4	4	4	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	12	12	8
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		0	0	0	0
Cumulative Potential Contaminant / Land Use Score		15	15	15	8
4. Final Susceptibility Source Score		13	13	13	13
5. Final Well Ranking		High	High	High	High

Ground Water Susceptibility Report Public Water System Name : KOOSKIA WATER DEPT Well# : WELL #3 HILLSID
Public Water System Number 2250032 12/9/02 2:32:21 PM

1. System Construction		SCORE				
Drill Date	7/17/74					
Driller Log Available	YES					
Sanitary Survey (if yes, indicate date of last survey)	YES	2001				
Well meets IDWR construction standards	NO	1				
Wellhead and surface seal maintained	YES	0				
Casing and annular seal extend to low permeability unit	NO	2				
Highest production 100 feet below static water level	YES	0				
Well located outside the 100 year flood plain	NO	1				
Total System Construction Score		4				
2. Hydrologic Sensitivity						
Soils are poorly to moderately drained	NO	2				
Vadose zone composed of gravel, fractured rock or unknown	YES	1				
Depth to first water > 300 feet	YES	0				
Aquitard present with > 50 feet cumulative thickness	NO	2				
Total Hydrologic Score		5				
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score	
Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0	
Farm chemical use high	NO	0	0	0		
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO	
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0	
Potential Contaminant / Land Use - ZONE 1B						
Contaminant sources present (Number of Sources)	YES	3	3	3	3	
(Score = # Sources X 2) 8 Points Maximum		6	6	6	6	
Sources of Class II or III leacheable contaminants or	YES	3	3	3		
4 Points Maximum		3	3	3		
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0	
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone 1B		9	9	9	6	
Potential Contaminant / Land Use - ZONE II						
Contaminant Sources Present	YES	2	2	2		
Sources of Class II or III leacheable contaminants or	YES	1	1	1		
Land Use Zone II	Less than 25% Agricultural Land	0	0	0		
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0	
Potential Contaminant / Land Use - ZONE III						
Contaminant Source Present	YES	1	1	1		
Sources of Class II or III leacheable contaminants or	YES	1	1	1		
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0		
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0	
Cumulative Potential Contaminant / Land Use Score		14	14	14	6	
4. Final Susceptibility Source Score		12	12	12	11	
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate	

Ground Water Susceptibility Report Public Water System Name : KOOSKIA WATER DEPT Well# : WELL #4 AIRPORT

Public Water System Number 2250032 12/9/02 2:32:39 PM

1. System Construction		SCORE
Drill Date	6/28/93	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	2001
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		3

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		6

3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	8	8	8	8
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	8	8	8	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		12	12	12	8
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		17	17	17	8
4. Final Susceptibility Source Score		12	12	12	12
5. Final Well Ranking		High	High	High	High